

Computer modeling aids solder reliability in nuclear weapons

By Sue Major Holmes

Solder isn't the first thing that comes to mind as essential to a nuclear weapon. But since weapons contain hundreds of thousands of solder joints, each potentially a point of failure, Sandia National Laboratories has developed and refined computer models to predict their performance and reliability.

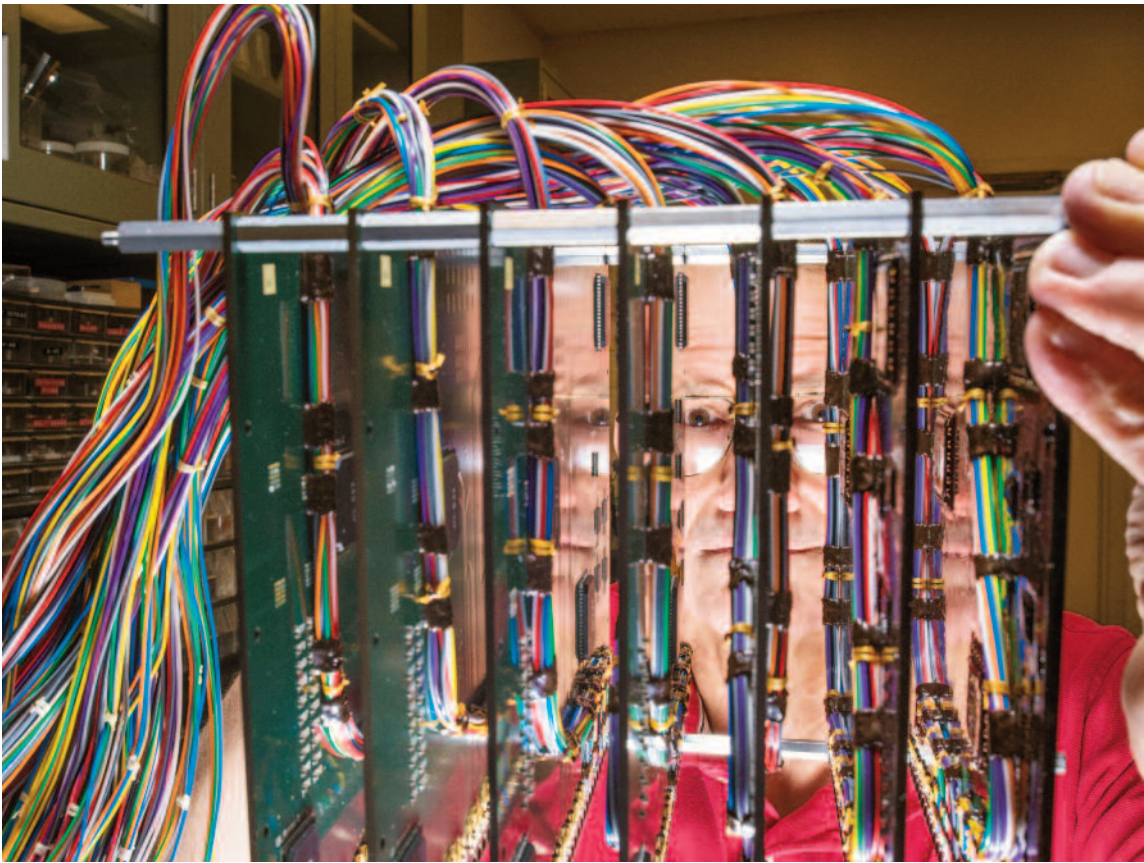
"Computational modeling of solder joint fatigue has become critical to Sandia and its role in the current nuclear weapons life extension programs, even before production assembly at the Kansas City National Security Campus," says materials scientist Paul Vianco, who works with material modeler Mike Neilsen. "Sandia uses the computational model to solve manufacturing issues as well as assess the impact of design changes on solder joint reliability.

"This is critical as we finalize designs and head into production," he says.

Anything with circuit boards requires countless solder joints, and miniaturization of electronics has vastly increased the number in printed wiring assemblies. Vianco lists two examples among a multitude of printed wiring assemblies for weapons: one with more than 900 solder joints, 400 on a single component; the other with about 300 joints.

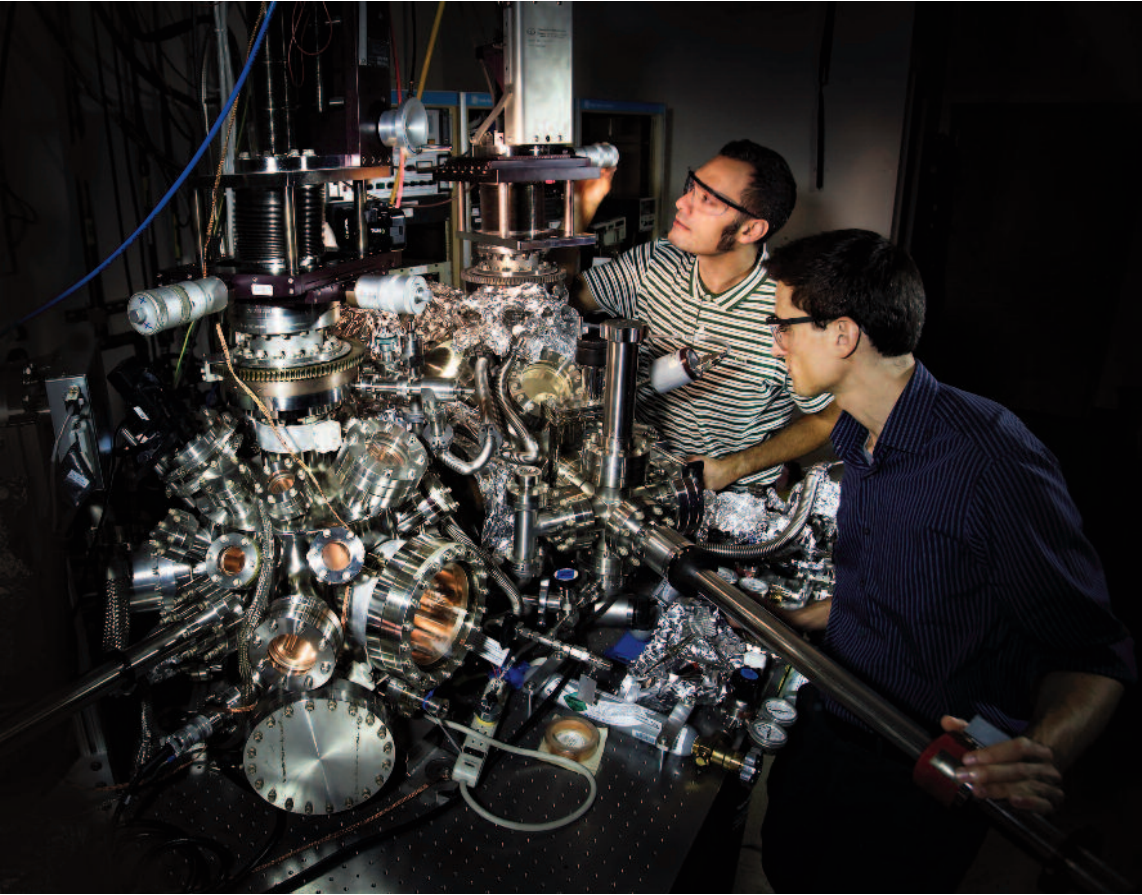
Sandia has advanced computational modeling to the point it can help guide component design decisions and assembly processes at the Kansas City National Security Campus, establish qualification and acceptance test definitions and provide long-term reliability of solder interconnections in the stockpile, he says.

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Materials scientist Paul Vianco peers through an experimental setup of printed wiring assemblies used to validate modeling in a Sandia National Laboratories project to study solder failure. Vianco said computational modeling of solder joint fatigue is critical to Sandia and current life extension programs for nuclear weapons. (Photo by Randy Montoya)

Reducing the traffic jam in batteries



SOLID PROGRESS – Sandia researchers Farid El Gabaly, left, and Forrest Gittleston use pulsed laser deposition and X-ray photoelectron spectroscopy to advance solid-state lithium-ion battery performance. (Photo by Dino Vournas)

Sandia researchers make solid ground toward better lithium-ion battery interfaces

By Michael Padilla

Research at Sandia National Laboratories has identified a major obstacle to advancing solid-state lithium-ion battery performance in small electronics: the flow of lithium ions across battery interfaces.

Sandia's three-year Laboratory Directed Research and Development project investigated the nanoscale chemistry of solid-state batteries, focusing on the region where electrodes and electrolytes make contact. Most commercial lithium-ion batteries contain a liquid electrolyte and two solid electrodes, but solid-state batteries instead have a solid electrolyte layer, allowing them to last longer and operate more safely.

"The underlying goal of the work is to make solid-state batteries more efficient and to improve the interfaces between different materials," Sandia physicist Farid El Gabaly says. "In this project, all of the materials are solid; we don't have a liquid-solid interface like in traditional lithium-ion batteries."

The research was published in a *Nano Letters* paper

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That’s that

In the spring of 1968 I had just turned 18 when Dr. Martin Luther King Jr. was assassinated in Memphis, Tennessee.

There would be other losses and other tragedies in that year: John F. Kennedy’s brother Robert was murdered while campaigning in California for the presidency; the Tet Offensive in Vietnam had changed the trajectory of that war, foreshadowing America’s ultimate retreat from Southeast Asia at the cost of almost 60,000 American lives; the very fabric of the country seemed to be ripping apart, with riots wracking more than 100 cities in the aftermath of Dr. King’s murder and the antiwar movement resorting to a combination of peaceful protests and in some cases violence to bring about the end of the war.

In April 1968, most of the worst that year had to offer was still in the future and my high school classmates and I were on sort a prolonged farewell tour of our old haunts and hangouts. We were all in the grip of senioritis and couldn’t wait for whatever was in store for us.

The reality of the war loomed over everything, and while many of us were headed for college and the get-out-of-jail-free draft deferments that went with it (a fact that shames me these many years later), we knew that some of our buddies – more than a few – were headed into harm’s way.

Still, for all of that, to be 18 in the spring when the world was young and your whole life ahead of you . . . well, that’s a pretty good place to be.

And then Dr. King was murdered.

I think it’s hard for most people born in the decades since his passing to understand what a powerful force he was in shaping the way Americans thought about race. When Dr. King first emerged onto the public stage in the 1950s, still a very young man, America was unambiguously a racially divided – no, let’s call it like it is – a racist country.

I spent some of my formative years in the 1950s living in small towns in the rural South and I remember well the apartheid-like environment in which African-Americans were forced to live. Not to belabor it, but I remember well the bus ride to the – all-white – school, driving past dwellings that can only be called shanties and seeing little black kids in rags playing with sticks in their front “yards.” I remember seeing black kids my age, or younger, picking cotton in the fields around our house. There was something badly wrong here, something badly out of whack and even as a pre-teen, I knew it in my bones.

Given the conditions they lived in, it was inevitable that there would come a time of reckoning when African Americans, who had played such a role in building this country, would demand a place at the table, an equal place. But they needed a champion and that champion was Dr. King.

There really isn’t a comparable figure on the public scene today and hasn’t been since he was taken from us. His voice transcended politics and ideology. He didn’t make partisan appeals to a “base” of like-minded supporters. He delivered a message that he demanded, through the force of his moral authority, be heard by all.

Of course there were those who despised him. Of course they did; they feared him. And they feared him because they knew he spoke the truth and the truth is the most powerful force there is. So he was vilified, mocked, arrested, and even beaten, but he wouldn’t be silenced. Not unless they killed him.

Dr. King held up a mirror to his fellow Americans, white Americans, and asked if they liked what they saw. And the answer, crossing all political party lines, was “No, this is not who we want to be. We want to be better than this.”

America still has some way to travel to realize Dr. King’s vision. But he set us on a path and it is one we must follow to the end because it is the right path and the path of righteousness.

And today, in a time when the divisions among and between us seem particularly stark, I think it serves us well to look, yet again, to Dr. King for guidance and for wisdom. He said:

We must develop and maintain the capacity to forgive. He who is devoid of the power to forgive is devoid of the power to love. There is some good in the worst of us and some evil in the best of us. When we discover this, we are less prone to hate our enemies.

See you next time.

– Bill Murphy (MS 1468, 505-845-0845, wtmurph@sandia.gov)

Trisha Miller presents TED-like talk on importance of chemical defense

By Michael Padilla



Trisha Miller delivers a TED-like talk on chemical security and defense. (Photo by Krissy Galbraith)

A recent TED-like talk by Sandia researcher Trisha Miller raised awareness about the opportunity Sandia has to lead the nation in chemical risk management.

An opportunity to develop a chemical-defense strategy

In her “Chemical Security & Defense” talk, Trisha provided a brief history of chemical warfare and terrorism from World War I to the present. She described a parallel history of how innovation in chemistry over the past several decades has evolved into a flourishing industry with a broad impact on the global economy.

“Sandia has an opportunity to apply our systems-analysis expertise to develop a tailored, balanced chemical-defense strategy,” she said. “Chemistry is part of the fabric of our society; therefore, a chemical-defense strategy must be balanced against the needs of the chemical industry.”

Assessing the risk of chemical attacks

Trisha said people often perceive chemical attacks as low risk because they have relatively low consequences compared to biological, radiation or nuclear attacks. However, when considering risk variables such as the likelihoods of scenario selection and successful execution of such a scenario, the risk of a chemical attack greatly increases. Therefore, Trisha argues, chemical defense must be considered independently from protecting against biological, radiation, or nuclear incidents.

During the talk, Trisha discussed four challenges in chemical security, including engaging private industry stakeholders, addressing risk perception, balancing safety versus security and pursuing vertical integration.

Enjoying the TED-like talk process

Trisha said she hopes Div. 8000 continues to provide an opportunity for workforce members to develop TED-like talks.

“For those interested in delivering a TED-like talk, I suggest picking a topic that people are passionate about,” she said. “That will help the presenters make a short, technical talk into a thought-provoking story.”

Trisha said she enjoyed presenting the talk and interacting with the audience.

“My favorite part of the talk was taking questions at the end,” she said. “It was interesting to see what parts of my talk caught the attention of the audience. I could tell where they were reevaluating their preconceived notions or where they learned something new about the topic.”

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William Hoffman (84)	Sept. 21
Gerald Hastings (93)	Sept. 26
Doris Mortensen (98)	Sept. 28
Jerry Romero (65)	Oct. 1
Lynne Powell (72)	Oct. 10
James Corey (78)	Oct. 12
Wayland Bell (74)	Oct. 15
Oscar Cox (65)	Oct. 15
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Computer modeling

(Continued from page 1)

“In the early stages of model development, we could sit down with designers and give them a very broad reliability window for solder joints. It was a case of saying, ‘Well, you’re not going to get into a lot of trouble because we know what’s going to happen here and here,’” Paul says, stretching out his hands. “What was happening in here” — the space between his hands — “could not be predicted with any confidence that allowed the engineers to use the models to guide their designs of electronic assemblies.”

That saves enormous amounts of money by eliminating the need to fabricate samples and the time required for equipment operations and data analysis, Paul says. Modeling can provide answers in one to two weeks instead of the months needed for experiments, he says.

Mike said his late mentor, Steve Burchett, pushed for Sandia’s early investment into computer models that could be used to predict when thermal mechanical fatigue cracks would start and grow in solder joints. He said Burchett recognized there was less margin for error as Sandia moved from plated through-hole interconnects to newer, more complex, surface mount assemblies.

Plated through-hole solder interconnects refer to drilling holes through printed circuit boards, plating the

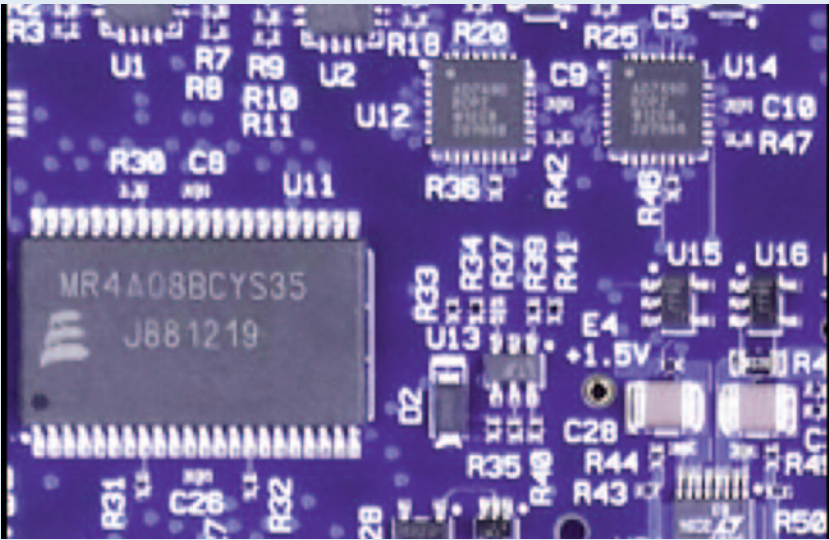
under fast loading rates like those generated by shock and vibration, he says.

Sandia validates models by accelerated aging, thermal cycling tests to quantify the statistical reliability of solder joints. Paul’s team designs and builds printed wiring assembly mockups scaled to the size of real assemblies, then tests them in research ovens that cycle temperatures between set maximums and minimums to record any electrical failures in solder joints. The team analyzes the failure to confirm it was due to the expected solder fatigue and not some other, unexpected cause.

“Today, we’re performing the thermal cycling experiments, collecting the data, doing the statistical analysis on that data to determine the long-term reliability of



Traditional plated through-hole solder joint technology



Advanced surface mount solder joint technology

The making of a solder model

The current solder model resulted from years of research and collaborations with universities and others. Sandia has modeled solder performance for more than 30 years, increasing models’ fidelity based on improved knowledge of properties of materials and experiments to develop and then validate the models.

The key, however, is that today’s models provide quantitative as well as qualitative data.

Qualitative engineering judgments are based on experience and comparing outcomes — A is better than B. Quantitative predictions are explicitly based on the physical behavior of a material in a design rather than a comparison with another material, and can say, for example, A is a better design than B because it will last X number of years longer.

holes with copper, pushing component leads through the holes and soldering them in place. Surface mount components are soldered to pads on the top or bottom of printed circuit boards.

Experimental characterization work fed into models

Paul and colleagues started experimental characterization work in the 1990s that provided data for a unified creep plasticity model that captures both creep of solder at low stress levels and plastic deformation at higher stress levels, Mike says. The model accurately described the mechanical response of solder to slow loading typically generated during thermal cycling. Recent experimental material characterization by researcher Brad Boyce and colleagues helped refine the model to capture the mechanical response of solder

area array solder joints,” Paul says.

Researchers validate solder fatigue crack initiation and growth predictions by comparing the model’s predictions with experimental results for different components: surface mount resistors and capacitors, leadless ceramic chip carriers, plastic ball grid arrays and the like. “Close collaboration between materials scientists and materials modelers is essential for the creation of good material models. We can accurately predict crack initiation locations, crack paths and the number of cycles needed to grow fatigue cracks,” Mike says.

The model also has generated some surprising results. “For example, voids in solder look bad but a uniform distribution of voids generally has little effect on fatigue life,” Mike says. He joked, “Maybe we should be using solder foam — if we could just figure out how to make it.”

Battery Interfaces

(Continued from page 1)

titled, “Non-Faradaic Li+ Migration and Chemical Coordination across Solid-State Battery Interfaces.” Authors include Sandia postdoctoral scientist Forrest Gittleson and Farid, members of the Materials Physics department. The work was funded by the Laboratory Directed Research and Development program, with supplemental funding by the Nanostructures for Electrical Energy Storage Energy Frontier Research Center within the DOE’s Office of Science.

Farid explains that in any lithium battery, the lithium must travel back and forth from one electrode to the other when it is charged and discharged. However, the mobility of lithium ions is not the same in all materials and interfaces between materials are a major obstacle.

Speeding up the intersection

Farid compares the work to figuring out how to make traffic move quickly through a busy intersection.

“For us, we are trying to reduce the traffic jam at the junction between two materials,” he says.

He likened the electrode-electrolyte interface to a tollbooth or merge on a freeway.

“We are essentially taking away the cash tolls and saying everybody needs to go through the fast track, so you’re smoothing out or eliminating the slowdowns,” he says. “When you improve the process at the interface you have the right infrastructure for vehicles to pass easily. You still have to pay, but it is faster and more controlled than people searching for coins in the glove box.”

There are two important interfaces in solid state batteries, he explained, at the cathode-electrolyte junction and electrolyte-anode junction. Either could be dictating the performance limits of a full battery.

Forrest adds, “When we identify one of these bottlenecks, we ask ‘Can we modify it?’ And then we try to change the interface and make the chemical processes more stable over time.”

Sandia’s interest in solid-state batteries

Farid says Sandia is interested in the research mainly because solid-state batteries are low maintenance, reli-



INTERFACE CONTACT – Sandia researchers Forrest Gittleson, left, and Farid El Gabaly investigate the nanoscale chemistry of solid-state batteries, focusing on the region where electrodes and electrolytes make contact.

(Photo by Dino Vournas)

able, and safe. Liquid electrolytes are typically reactive, volatile, and highly flammable and are a leading cause of commercial battery failure. Eliminating the liquid component can make the devices perform better.

“Our focus wasn’t on large batteries, like in electric vehicles,” Farid says. “It was more for small or integrated electronics.”

Since Sandia’s California laboratory did not conduct solid-state battery research, the project first built the foundation to prototype batteries and examine interfaces.

“This sort of characterization is not trivial because the interfaces that we are interested in are only a few atomic layers thick,” Forrest says. “We use X-rays to probe the chemistry of those buried interfaces, seeing through only a few nanometers of material. Though

challenging to design experiments, we have been successful in probing those regions and relating the chemistry to full battery performance.”

Processing the research

The research was conducted using materials that have been used in previous proof-of-concept solid-state batteries.

“Since these materials are not produced on a massive commercial scale, we needed to be able to fabricate full devices on-site,” Farid says. “We sought methods to improve the batteries by either inserting or changing the interfaces in various ways or exchanging materials.”

The work used pulsed laser deposition and X-ray photoelectron spectroscopy combined with electrochemical techniques. This allowed very small-scale deposition since the batteries are thin and integrated on a silicon wafer.

“Using this method, we can engineer the interface down to the nanometer or even subnanometer level,” Forrest says, adding that hundreds of samples were created.

Building batteries in this way allowed the researchers to get a precise view of what that interface looks like because the materials can be assembled so controllably.

Demonstrating performance of solid-state batteries

The next phase of the research is to improve the performance of the batteries and to assemble them alongside other Sandia technologies.

“We can now start combining our batteries with LEDs, sensors, small antennas or any number of integrated devices,” Farid says. “Even though we are happy with our battery performance, we can always try to improve it more.”



SANDIA GEOPHYSICISTS Danny Bowman and Sarah Albert, display an infrasound sensor and the Styrofoam box used to protect the sensors from the extreme temperatures experienced by their balloons. Sarah has found testing balloon-borne infrasound sensor arrays really exciting. “It’s one of those projects that you imagine scientists do when you’re a child.” (Photo by Randy Montoya)

New Sandia balloon-borne infrasound sensor array detects explosions

By Mollie Rappe

Sheets of plastic similar to that used for garbage bags, packing tape, some string, a little charcoal dust, and a white shoebox-sized box are more than odds and ends. These are the supplies Danny Bowman, a Sandia National Laboratories geophysicist, needs to build a solar-powered hot air balloon for detecting infrasound.

Infrasound is sound of very low frequencies, below 20 hertz, which is lower than humans can hear. African elephants produce infrasound for long-distance communication at around 15 hertz. For comparison, a bumblebee’s buzz is typically 150 hertz and humans hear in the range of 20 to 20,000 hertz.

Last July, a fleet of five solar-powered balloons reached a height of 13 to 15 miles, twice as high as commercial jets, and detected the infrasound from a test explosion. This experiment was funded by Sandia’s Laboratory Directed Research and Development program. Danny presented the results at the American Geophysical Union conference in December. The results will be published soon.

Infrasound is important because it’s one of the verification technologies that the US and the international community use to monitor explosions, including those caused by nuclear tests. Traditionally, infrasound is detected by ground-based sensor arrays, which don’t cover the open ocean and can be muddled by other noises, such as the wind. Danny says air conditioners are also a common source of infrasound noise.

“The stratosphere is much less noisy so you can detect events of interest to science and national security from greater distances,” Danny says. The stratosphere is

the atmospheric layer from about 5 miles to 31 miles above the ground.

Inexpensive hot air balloons fly all day

The solar-powered hot air balloons take three hours for Danny and fellow geophysicist Sarah Albert to make and use about \$50 worth of materials, not including the reusable infrasound sensor or GPS tracker. The charcoal dust helps heat up the air inside the balloon, providing lift without requiring helium gas, a nonrenewable resource.

The balloons can even be launched on partly cloudy days, Sarah says. They stay up in the stratosphere all day and come down after the sun sets. This “guaranteed termination mechanism” is both a pro and con, Danny says.

It’s a fool-proof way to bring down the balloons, the sensors, and the data they have collected. On the other hand, longer flights would be useful. During the Arctic summer, the balloons could fly for weeks, but the team is also working on balloons that can keep flying at night.

For future experiments, Danny is interested in a balloon design with an insulator on the top surface of the balloon and absorber on the bottom, so it absorbs heat from the Earth to allow it to keep flying at night.

Multiple sensors determine location

The most important aspect of this experiment is that the five balloons formed a 3-D array of sensors, Sarah says. One sensor can hear a sound, but cannot provide any location information. Sarah says, “My mom is deaf in one ear so it’s hard for her to tell where a sound is coming from.” Having two ears allows ani-

mals to determine the source of a sound.

Five microphones in an array, as in this experiment or ground-based sensor arrays, provide the same information — the direction the sound wave is coming from. Researchers coordinate the information from multiple arrays to triangulate the source of the sound.

Calculating where the sound wave is coming from can be a challenge when each sensor in the array is moving relative to each other and the source, admits Danny. A lot of computational algorithms assume stationary sensors, so the team needed to adapt them to include GPS information.

Future use in treaty monitoring and solar system exploration

Danny has proposed flying balloon-borne infrasound sensors as a part of the next series of the NNSA’s Source Physics Experiment project. This project develops new and improved, physics-based approaches for monitoring underground nuclear explosions.

In addition to potential treaty monitoring and national security uses, Danny and Sarah hope to fly hot air balloons in non-terrestrial experiments.

Danny is assisting a NASA Jet Propulsion Laboratory project to explore the possibility of using balloon-borne infrasound sensors on Venus to listen for Venus-quakes. Venus is similar to Earth in mass, but is geologically very different with no apparent plate tectonics.

Another possibility the team is exploring is flying infrasound sensors on Jupiter. Jupiter is a gas giant with open scientific questions about its internal structure and geology that infrasound could help answer. “We’re still decades out from an actual mission,” Danny says, “but I’m excited to see how far it will go.”

The results from his prior research test flying individual infrasound sensors on balloons was published in *Geophysical Research Letters*, and more recently in *Journal of Geophysical Research: Atmospheres*.

Danny says, “This is a really exciting new area of research. Balloon-borne infrasound sensors will never replace ground-based acoustic arrays, but I think it can augment them. And the most exciting thing is flying in the atmospheres of other planets and what we can learning from them.”



UP UP AND AWAY – A solar-powered hot air balloon taking flight bearing sensors including a GPS tracker and reusable infrasound sensor. (Photo by Danny Bowman)



HIGH ABOVE IT ALL – A view of the earth from one of the solar-powered hot air balloons. Taken last July at a height of about 13 miles. (Photo courtesy of Guide Star Engineering, LLC)

Storing and controlling renewable energy

Sandia evaluates control algorithms for energy storage systems

By Kristen Meub

Grid-scale batteries get more popular every day as the world looks to renewable energy sources and the need grows to store and use it on demand. However, utility companies need to know the best way to operate those batteries to meet specific energy management goals. Sandia is helping by testing a large vanadium redox flow battery at its Energy Storage Test Pad site, and developing a system to evaluate and refine the calculations that control how the battery works.

Researchers have used the same test site at Sandia since 2012 to characterize how battery systems perform. Now they are moving beyond battery performance and reliability to study how energy storage control algorithms affect both grid resiliency and applications that could lead to significant cost savings. A control algorithm uses a set of rules that prompt an action or multiple actions to occur based on real-time data and measurements. The project also will study long-term battery capacity change, measure performance degradation over time, and assess control system cybersecurity.

“We are developing different control models at Sandia to look at how to best dispatch energy from storage systems – when, where, and how much,” engineer Ben Schenkman says. “Every battery vendor needs control with energy storage, so there are a lot of controls out there. We want to evaluate which controls work the best for specific energy management goals, like peak-shaving, transient stability, and energy shifting, and validate those models.”

Charles Hanley, senior manager of Sandia’s grid modernization programs, says the project will ease the way to a more resilient national electric grid supported by battery storage.

“We envision a future electric grid with massively large amounts of battery storage, with systems that range across various physical sizes and applications,” Charles says. “Understanding how best to utilize these batteries safely and economically will add to the overall resilience of our electric grid. This installation is critical for us as we address this national challenge.”

Boosting grid resilience and saving money

To study how energy storage controls can impact resiliency, the research team will connect the battery — which can generate 250 kilowatt for up to four hours — to the microgrid at Sandia’s Distributed Energy Technologies Laboratory and evaluate how it performs when it is isolated from the grid. They are also assessing the economic impacts of various control models and how and when to use them.



STORING ENERGY — Sandia installed a 250KW/1MWh vanadium redox flow battery at its Energy Storage Test Pad site to evaluate and refine battery control algorithms.

“We are looking at how the same battery that makes your grid more resilient during severe weather can also have a daily economic value by using various control methods and applications,” Ben says. “Severe weather can be a high-consequence event, but you won’t need your battery for resilience applications every day.”

Sandia also will test various control systems supplied by battery vendors to evaluate and recommend refinements, based on how they perform. “They can bring in their controls, and we can evaluate them and study how they work with the system,” Ben says. “We’ll look for flaws and opportunities for enhancements, and we’ll also be able to run an apples-to-apples type of comparison on controls.”

Tiered Accountability meetings highlight issues and foster faster solutions across the Labs

By Charlene Coriz

Five months ago, the Laboratory Operating System (LOS) was introduced to Sandia. It was the first step in Sandia’s efforts to enhance the behaviors, processes, and tools needed to effectively deliver value to the Labs’ customers. “My first experience with LOS was the weekly division tier meetings,” said Teresa Ostrem, Mission Services Human Resources business partner. “I’ve been able to inform our leadership team about changes on the HR horizon, allowing them to prepare their areas in advance. I’ve learned that LOS doesn’t change how Sandia does business; it just enhances the Labs’ effectiveness.”

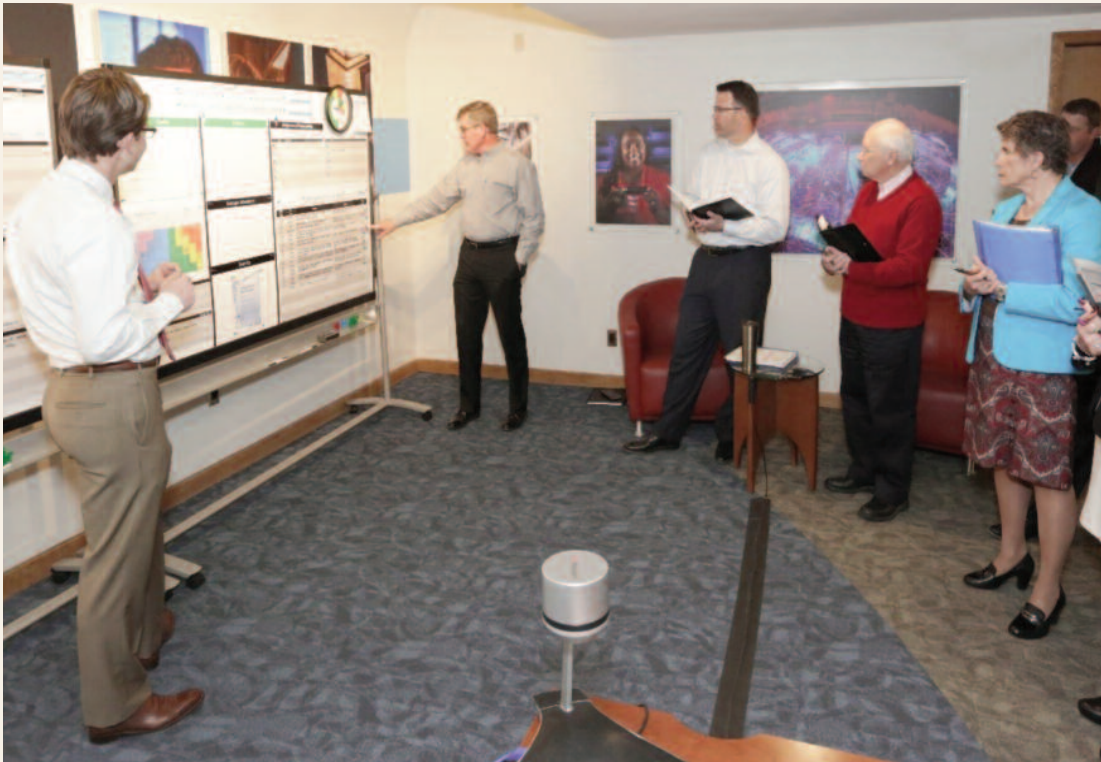
Almost every organization – big or small – has some type of an operating system (formal or otherwise) to define and demonstrate how they do business. The intent for the LOS is to augment Sandia’s current operating system and build off what’s done today using a consistent, purposeful approach. The LOS is comprised of six enablers: Strategy Deployment, Data-driven & Visual Management, Tiered Accountability, Problem Solving & Continuous Improvement, User-centered Design, and Velocity Technology Development. The tools, processes, and behaviors work together to produce an engaged workforce, operational effectiveness, and customer value.

The first enabler launched was Tiered Accountability, a communication tool designed to enable quick information sharing up and down the organization. The objective is to make key information visible, reinforce accountability, identify and escalate issues, and to ensure people focus on the right work priorities.

Tiered Accountability started at the executive level (Tier 5), and today, there are more than 150 active tier boards at all levels of the organization.

“At the Division 1000 level, our tier boards help our management stay apprised of what is going on, who is visiting an important customer, what challenges one organization might be having delivering to mission, and where we need help from people above us. Tier boards allow us to get real time feedback. Rather than a series of meetings, we can turn to our tier boards,” says Susan Seestrom, chief research officer.

Recently at the Center 1400 (Tier 3) level, Director



THE SENIOR LAB LEADERSHIP TEAM discusses important topics at a recent weekly tier meeting.

Scott Collis escalated an issue regarding pedestrian safety on Innovation Parkway after noting speeding is a concern for staff walking between the Cyber Engineering Research Laboratory and Computer Science Research Institute facilities. This issue was added to the Rolling Action Item List on the Tier 3 board and quickly escalated up to Tier 5 (Senior Leadership Team). The action was assigned to both Susan and Jaime Moya, Environment, Safety, & Health director, who worked with their teams, as well as Safeguards & Security. Together, they developed solutions within two weeks. The actions to increase pedestrian safety included partnering with the city of Albuquerque to conduct traffic studies during peak traffic times, installation of a radar speed sign, cleanup of overgrown vegetation covering traffic signs, and teaming with the Albuquerque

Police Department to post officers at key points. This is just one example of how groups can use tier boards to identify issues and involve the right people quickly in developing solutions.

Tiered Accountability is just one piece of the LOS puzzle. Other LOS enablers are being developed in partnership with key stakeholders around the Labs. A roadmap is being created by the LOS team to address requirements and build on best practices. Josh Parsons, Business Excellence director, adds, “There are teams across the Labs using LOS tools and seeing success. Part of our journey will be to highlight that work, identify the key processes, and then share them across the organization.”

LOS resources and tools are being fashioned, iterated on, and made available by the LOS team on the LOS website (los.sandia.gov).

Sandia Volunteers

Volunteers give time to make a difference in the community for Sandia Serves Saturdays

Photos by Katrina Wagner

This fall, nearly 130 Sandia employees and their family members and friends volunteered on Saturdays to help the community. Nine Albuquerque organizations that serve thousands of people benefitted from the volunteer efforts. Many of this year's projects were kid-friendly, encouraging families to teach the importance of community service to their children. "I'm so proud of all of the kids that painted beds at the homeless shelter and picked apples for those in need," says Katrina Wagner, the community relations specialist who organized the activities.

Volunteers beautified the Westside Emergency Homeless Shelter, painted the interior at St. Martin's Hopeworks, prepared a meatloaf dinner at the Ronald McDonald House, harvested 5,000 pounds of apples with Seed2Need, and harvested produce at CasaQ. Volunteers also handed out food at a mobile food pantry with Storehouse New Mexico, sorted cans and cereal at Roadrunner Food Bank and cleaned the barn and chicken coop at Mandy's Farm.



Mandy's Farm is a nonprofit organization that assists individuals with Developmental Disabilities to achieve goals by structuring a positive, purposeful and caring environment for living, learning, and working in the community.



St. Martin's HopeWorks provides critical services for people experiencing homelessness and near homelessness. It provides Mental Health/Behavioral Health/Therapy and Recovery Services, Housing, Emergency Support Services, Employment Services/ Hope Cafe Employment Lab.



CasaQ provides safe living options and services for lesbian, gay, bisexual, transgender, queer and questioning (LGBTQ) youth and allies who are at risk of or experiencing homelessness. Allies are typically people who do not identify as LGBTQ, but support and fight to end the injustices that occur to those who do.



Seed2Need is a non-profit, collaborative effort between the Sandoval County Master Gardeners, property owners in the village of Corrales, volunteer groups, and hundreds of individuals from Corrales, Rio Rancho, Placitas, and Albuquerque. Our mission is to reduce hunger and to improve the nutrition of families facing food insecurity within our community.





Roadrunner Food Bank of New Mexico has been serving New Mexico’s hungry since 1980 thanks to a vision by founder Reverend Titus Scholl, who started the organization by distributing food to the hungry out of the trunk of a car. From those humble beginnings much has changed in Roadrunner’s 35+ year history. The Food Bank has had three different homes including its current home, a renovated food distribution facility on Office Boulevard. But the one thing that hasn’t changed in our 35-year history is our service to the hungry people in our community.



Ronald McDonald House
Many families travel far from home and spend several weeks or months to get treatment for their seriously ill or injured children – a long time to be away or to divide a family. And, for children facing a serious medical crisis, nothing seems scarier than not having a parent close by for love and support. Ronald McDonald House Charities of New Mexico provides that “Home-away-from-home.”



Albuquerque Westside Emergency Homeless Shelter
Winter shelter provides emergency shelter services to homeless individuals and families during the winter months. The shelter opened Nov. 15, and will be open through March 15, 2018. The shelter accepts single men and women, families, and families with children younger than 18.



Run, hide, fight

Sandia reality-based active shooter training teaches life-saving tactics

By Manette Newbold Fisher

Like a lot of concertgoers who attended the Route 91 Harvest music festival in Las Vegas this year, Marlene Lucero thought she was hearing fireworks when the first round of gunfire rained down on fans. But then the man next to her husband fell to the ground and a second wave of pops rang through the air.

That’s when she made her husband run.

Words echoed in her mind from active shooter training she took at Sandia National Laboratories just five days earlier. If it’s possible, the best option is to run, the instructors told her. So even as gunfire ricocheted all around her, she and her husband didn’t stop moving until they were in a stranger’s car driving away from the Las Vegas Strip.

Marlene credits active shooter training for saving her during the deadliest shooting in modern U.S. history that left 58 people dead and injured nearly 500. One thing she might not have normally done was notice exits as she and her husband, Eric Lucero, roamed the concert grounds. She did notice the exits that night, though, and didn’t hesitate to run.

“Seconds mattered,” she says. “It took no time, but I noticed where the exit was and it saved us precious seconds because we knew where to run.”

A procurement manager at Sandia, Marlene and a few colleagues participated in reality-based active shooter training at the Labs. Instructors ran through two scenarios. In one, Marlene played a victim; in the other, she was the shooter.

The Protective Force Training Staff has been teaching reality-based active shooter training since 2010, following a shooting at Encore near the Labs’ facilities that killed three people and wounded four others.

Previously, active shooter training had been reserved for officers, but after the Encore shooting employees started asking for training as well. The ProForce training staff suggested conducting briefings and scenarios in the workplace to give participants a more realistic idea of what their options would be.

Manager Bill Boling says officers use IR tactical weapons, which are like laser tag guns, during the training. Officers and the “shooter” are outfitted with stress vests and shock belts. When hit, a shock is emitted and the participant is taken out.

“We use a pop gun that replicates the sound of gunfire,” says ProForce Lt. Norman Baca. The idea is to get participants familiar with the sound so they know when to react.

“When the hairs on the back of your neck stand up, when you get that feeling, go. What we’ve done is we’ve tried to make it as real as possible,” Norman says. “We try to utilize the facilities here at the Labs, the office spaces, the conference rooms, anywhere where some-



CONCERT VIEW — This is the view Sandia manager Marlene Lucero had at the Route 91 Harvest music festival right before the deadliest US mass shooting took place at the concert. Mandalay Bay is shown in the background, where shooter Stephen Paddock fired from his hotel room. (Photo courtesy Sandia National Laboratories)

thing might take place. We utilize members of the workforce as role players.”

Training teaches participants to never give up

Norman and Lt. Andy Tabios emphasize waiting for the worst is not the only option.

“The sad fact is a lot of good people, just before lights out, the last thought through their mind is, ‘This can’t be real, this can’t be happening to me,’” Norman says. “If that’s your thought in a hostile environment,

you’ve already lost. You’re already behind the power curve. Rather your first thought should be, ‘I thought this might happen and I know what to do.’ ”

If people can run, they should and not look back, he says.

That was the thought that kept coming back to Marlene in Las Vegas.

“It was interesting because that’s what clicked. Like at the time, it was run,” she says. “That’s your best option. Even if you are in close proximity of the shooter, if you’re moving, it’s harder for them to hit you.”

If people have to hide, they can use barriers such as tables, chairs, and cabinets to better secure their area. As a last option, they can fight – throwing objects, creating distractions and physically fighting back.

“It’s hard to train for these events because they are all different and unique in their own way, but you always need to run, hide and the last option is to fight,” Marlene says.

Norman said teaching the physical response in active shooter training is easy. Trying to teach mental stability in crisis is much harder. What happens most often, he said, is people freeze and do nothing.

“Worst case scenario is giving up. Giving up is not an option,” Andy says. “If your mind says give up, your body just follows. In the military, if you’re in a losing situation, you come up with something else. Don’t ever give up.”

Want active shooter training?

If you’re interested in attending an active shooter briefing or participating in reality-based training, call Security Connection, 845-1321. During briefings, officers address members of the workforce and discuss options during a crisis situation. Reality-based training gives employees an opportunity to participate.

Levels of Awareness

In active shooter training at the Labs, instructors teach participants five levels of awareness, emphasizing the worst thing people can do is nothing.

WHITE
A person is unaware of the surrounding environment. This includes not paying attention to emergency exits and others moving around, how they are dressed, and what conversations they participate in. The white level of awareness is appropriate when people are safe and secure at home. The only way a person at the white level will survive a lethal encounter will be if the opponent misses or messes up.
YELLOW
People should try to be in a yellow level of awareness in public. This is a relaxed alert where a person is aware of the surrounding environment, other people walking around, how they are dressed, exits, conversations, and others’ demeanors.
ORANGE
The orange level arises during a tense situation, such as being near an argument that gets out of hand, noticing someone concealing his or her hands, or paying attention to a car parked where it’s not supposed to be. At this level, the person is getting ready to respond if necessary.
RED
This level requires action. Red is for situations such as someone pulling out a gun and pointing it at someone. People should run, hide, or fight.
BLACK
The black stage is when someone freezes. Active shooter training instructors make it clear this is not what people should do. If people sense their mind and body freezing, instructors tell them to do something, keep moving, and remain aware of options.

Pioneering smart grid technology solves decades old problematic power grid phenomenon

Sandia s new control system uses real-time data to reduce inter-area oscillations

By Kristen Meub

Picture a teeter-totter gently rocking back and forth, one side going up while the other goes down. When electricity travels long distances, it starts to behave in a similar fashion: The standard frequency of 60 cycles per second increases on the utility side of the transmission line while the frequency on the customer side decreases, switching back and forth every second or two.

This phenomenon — called inter-area oscillations — can be a problem on hot summer days when the demand for power is high. As more power is transmitted, the amplitudes of the oscillations build and can become disruptive to the point of causing power outages. Until now, the only safe and effective way to prevent disruptive oscillations has been to reduce the amount of power sent through a transmission line.

Sandia and Montana Tech University have demonstrated an R&D 100 award-winning control system that smooths out these oscillations using new smart grid technology in the western power grid. The new system allows utilities to push more electricity through transmission lines, leading to lower costs for utilities and consumers and greater stability for the grid.

How inter-area oscillations affect grid stability

“Most of the time these oscillations are well-behaved and not a problem — they are always there,” Sandia engineer David Schoenwald says. “But at a moment when you are trying to push a large amount of power, like on a very hot day in the summer, these oscillations start to become less well behaved and can start to swing wildly.”

In August 1996, such oscillations became so strong that they effectively split apart the entire western electric power grid, isolating the Southwest from the Northwest. As a result, large-scale power outages affecting millions of people occurred in areas of Arizona, California, Colorado, Idaho, Oregon, Nevada, New Mexico, and Washington.

“The economic costs and the new policies and standards that were instituted because of this catastrophe cost the utility companies several billion dollars,” David says. “For the last 21 years, utilities have handled these oscillations by not pushing as much power through that corridor as they did before. Basically, they leave a lot of potential revenue on the table, which is not ideal for anyone because customers have needed to find additional power from other sources at a higher price.”

Solving a 40-year old problem with advances in smart grid technology

Scientists and utility companies have known about inter-area oscillations for more than 40 years, but developing a safe and effective way of damping, or controlling, the oscillations has been elusive because of the lack of real-time measurement data available from throughout the grid. Developing a way to the control the oscillations is especially enticing because the alternative solution for sending more power is to build additional transmission lines, which cost about \$10 million per mile and take more than 10 years to build and deploy.

During the last four years, the DOE’s Office of Electricity Delivery & Energy Reliability and the Bonneville Power Administration have funded a research team at Sandia and Montana Tech University to build, test, and demonstrate a control system that can smooth out inter-area oscillations in the western power grid by using new smart grid technology.

“At the moment the oscillations start to grow, our system counters them, actively,” David says. “It’s essentially like if the teeter totter is going too far one way, you push it back down and alternate it to be in opposition to the oscillation.”



SMART GRID — Sandia’s control system improves damping of inter-area oscillations and power grid reliability. This control system is the first successful grid demonstration of feedback control using phasor measurement units, making it a game changer for the smart grid.

Sandia’s new control system smooths the inter-area oscillations on the AC corridor by modulating power flow on the Pacific DC Intertie — an 850-mile high voltage DC transmission line that runs from northern Oregon to Los Angeles and can carry 3,220 megawatts of power, which is enough to run the entire city of Los Angeles during peak demand.

“We developed a control system that adds a modulation signal on top of the scheduled power transfer on the PDCI, which simply means that we can add or subtract up to 125 megawatts from the scheduled power flow through that line to counter oscillations as needed,” David says.

The control system determines the amount of power to add or subtract to the power flow based on real-time measurements from special sensors placed throughout the western power grid that determine how the frequency of the electricity is behaving at their location.

“These sensors continuously tell us how high that teeter-totter is in the Northwest and how low it is in the load centers of the Southwest, and vice versa,” David says. “These sensors are the game changer that have made this control system realizable and effective. The idea of modulating power flow though the Pacific DC Intertie has been around for a long time, but what made it not only ineffective but even dangerous to use was the fact that you couldn’t get a wide-area real-time picture about what was happening on the grid, so the controller would be somewhat blind to how things were changing from moment to moment.”

DOE has been encouraging and funding the installation and deployment of these sensors, called phasor measurement units, throughout the western grid. David says this innovation has allowed the research team to “design, develop and demonstrate a control system that does exactly what has been dreamed about for the better part of half a century.”

“We have been able to successfully damp oscillations in real time so that the power flow through the corridor can be closer to the thermal limits of the transmission line,” he says. “It’s economical because it saves utilities from building new transmission lines, it greatly reduces the chance of an outage and it helps the grid be more stable.”

Ensuring data integrity on the grid

Because accurate real-time data about how the grid is behaving is critical to ensuring the control system’s ability to safely counter strong oscillations, the research team has built

in a supervisory system that is able to guard against data-quality concerns.

“One of the things we are very concerned about is the integrity of the measurements we are receiving from these sensors,” David says.

Sandia’s control system and the sensors throughout the grid both use GPS time stamping, so every piece of data has an age associated with it. If the time delay between when the sensor sent the data and when the control system received it is too long — in this case greater than 150 milliseconds — the controller doesn’t use that data.

“When the data is too old there’s just too much that could have happened, and it’s not a real-time measurement for us,” David says. “To keep from disarming all the time due to minor things, we have a basket of sensors that we query every 16 milliseconds in the north and in the south that we can switch between. We switch from one sensor to another when delays are too long or the data was nonsensical or just didn’t match what other locations are saying is happening.”

Demonstrating control

Sandia demonstrated the controller on the Western grid during three recent trials in September 2016, May 2017, and June 2017. During the trials the team used controlled disruptions — events that excite the inter-area oscillations — and compared grid performance with Sandia’s controller working to counter the oscillations versus no controller being used. The demonstrations verified that the controller successfully damps oscillations and operates as designed.

“This is the first successful demonstration of wide-area damping control of a power system in the United States,” Sandia manager Ray Byrne says. “This project addresses one north-south mode in the Western North America power system. Our next step is to design control systems that can simultaneously damp multiple inter-area oscillations on various modes throughout a large power system.”

“A lot of time R&D efforts don’t make it to the prototype and actual demonstration phase, so it was exciting to achieve a successful demonstration on the grid,” Sandia engineer Brian Pierre says.

Sandia’s control system could be replicated for use on other high voltage DC lines in the future, and components of this system, including the supervisory system, will be used for future grid applications.



R&D 100 WINNER

The control system won a 2017 R&D 100 award. The new system allows utilities to push more electricity through transmission lines, leading to lower costs for utilities and consumers and greater stability for the grid.

SUPER MOON

Super moon (perigee syzygy of the Earth–Moon–Sun system) over Sandia Crest photographed from North Tramway Boulevard at 6:37 p.m. Sunday, Dec. 3, by physicist Paul Schmit of Pulsed Power Sciences.



HOLIDAY ELVES from Sandia’s Community Involvement pose with a small fraction of the thousands of toys donated by Sandia members of the workforce and headed for foster children in Bernalillo County. (Photo by Randy Montoya)

Sandia makes holiday gift wishes come true for Bernalillo County’s more than 1,100 foster children

By Stephanie Holinka

Sandia’s annual holiday gift drive for Children Youth and Families Department foster children provides gifts for children who may not otherwise receive a present during the holidays.

The program, organized by Sandia’s Community Involvement department, helps make the holidays for Bernalillo County’s approximately 1,140 foster children a little brighter.

Each year, members of the workforce sign up to sponsor individual foster children. Those gifts are dropped off to the Community Involvement office, and then delivered to New Mexico Kids Matter offices.

“The program at Sandia has grown in the last few years from serving 500 or so children in the foster care system to proving gifts to all of the children in foster care in Bernalillo County,” says chief gift wrangler Roberta Rivera.

This year, Transportation and Receiving team members delivered thousands of gifts and gift cards to New Mexico Kids Matter offices, which overflowed the offices and conference rooms.

“Sandia members of the workforce are generous with their time and their gifts. So many people put a great deal of thought into choosing gifts for their sponsored foster children this year, and they came up with some really great ideas,” Roberta says.

Veronica Montano-Pilch, executive director of New Mexico Kids Matter, says, “What Sandia is giving is more than a toy, they are giving kids a memory so they can feel special.”

Sandia’s Community Involvement department has organized the holiday gift drive since 2004. To learn more about Sandia’s charitable efforts, visit <http://www.sandia.gov/about/community/index.html>.

SANDIA CLASSIFIED ADS

MISCELLANEOUS

BDA UTILITY TRAILER, 2015, 4' x 4' x 6', excellent condition, located in East Mountains. \$1,650. Willmas, 505-281-9124.

POPEJOY TICKETS, "A Chorus Line" March 11, 6:30 p.m., 2, \$49.75 ea.; "Les Misérables," May 13, 6:30 p.m., 2, \$63.50 ea.; great orchestra seats, east side, row P, inside aisle. Hoyal, 505-823-1421.

MOTORCYCLE HELMETS, HJC, w/receive/transmit capability, \$125; Tourmaster Jackets, 1 new, 1 worn once, \$145. Wells, 505-292-0179.

TABLE, Hecho en Mexico, 84" x 40" x 30", rustic, solid wood, w/beautiful table cloths, removable legs, \$300. Giering, 505-818-8195.

PRINTER/COPIER/SCANNER, new, HP Deskjet 3722, not compatible w/my old laptop, \$55. McDonald, 907-830-4938.

3D PRINTER, MakerGear M2, prints PLA, ABS & more, very lightly used, <50 hrs., \$1,100. Smith, 505-269-1211.

OUTDOOR CLOTHES DRYER, umbrella-style, steel frame, 182-ft. of line, new, still-in-box, \$40. Gorman, 505-269-2969.

TRANSPORTATION

'05 ACURA TL, 6-spd. manual, navigation, abyss blue, 177K miles, \$6,000 OBO. Keegan, 505-238-3638.

RECREATION

STARCRAFT TRUCK POP-UP CAMPER, heater, refrigerator, gas or electric, AC, gas cook top, fits 7-ft. truck, \$4,000. Hibray, 821-3455.

MEN'S SCHWINN VARSITY TEN-SPEED, blue, garaged, well-maintained, excellent, like new condition, photos available, \$200. Kotoski, 220-4691.

REAL ESTATE

4-BDR. HOME, 2 baths, 1,387-sq. ft., refrigerated air, granite, wood floors, Eubank/Indian School, \$196,900. Sanchez, 505-410-2876.

WANTED

TUTOR, for CNM student studying programming, C++/part 2, SQL, Linux, Visual Studio, friendly, special needs, paid. Hess, 505-379-3715.

MOUNTAIN BIKES, for small adults, need 2, want quality but reasonable cost. Padilla, 505-639-3868.

How to submit classified ads

DEADLINE: Friday noon before week of publication unless changed by holiday.

Submit by one of these methods:

- EMAIL: Michelle Fleming (classads@sandia.gov)
- FAX: 844-0645
- MAIL: MS 1468 (Dept. 3651)
- INTERNAL WEB: From Tech-web search for 'NewsCenter', at the bottom of that page choose to submit an ad under, 'Submit an article'. If you have questions, call Michelle at 844-4902.

Because of space constraints, ads will be printed on a first-come basis.

Ad rules

1. Limit 18 words, including last name and home phone (If you include a web or e-mail address, it will count as two or three words, depending on length of the address.)
2. Include organization and full name with the ad submission.
3. Submit ad in writing. No phone-ins.
4. Type or print ad legibly; use accepted abbreviations.
5. One ad per issue.
6. We will not run the same ad more than twice.
7. No "for rent" ads except for employees on temporary assignment.
8. No commercial ads.
9. For active Sandia members of the workforce, retired Sandians, and DOE employees.
10. Housing listed for sale is available without regard to race, creed, color, or national origin.
11. Work Wanted ads limited to student-aged children of employees.
12. We reserve the right not to publish any ad that may be considered offensive or in bad taste.

Mileposts



New Mexico photos by Michelle Fleming
California photos by Randy Wong



Ruth Boyd

25



Cindy Burns

25

Recent Retirees



New Mexico photos by Michelle Fleming
California photos by Randy Wong



Margaret Mora

25



Corey Cruz

15



Johnny Ethridge

15



Robert Biefeld

43



Bob Brandt

32



Peter Kobos

15



Karen McDaniel

15



Melanie Mead

15



Sandy Ballard

30



Toys for Tots Block Party brings together holiday spirit

By Michael Padilla

Toys, toys, and more toys.

That was the sight at the 4th annual Toys for Tots Block Party at Sandia/California. For the past few weeks, multiple collection boxes were placed around the site for new and unwrapped toys. More than 600 toys were collected during the toy drive and party. The event was spearheaded by Sandia/California's Protective Force and Security Operations in partnership with the 6th Air Naval Gunfire Liaison Company. "Once again Sandians outdid themselves," said Dennis Baker, manager of Sandia/California's Physical Security Systems. "Sandia employees know that every child in the Bay Area deserves a gift this holiday season." Santa Claus made a special appearance at the event. Partygoers drank hot chocolate and got a chance to take selfies with St. Nick. Sandia's Protective Force officers showcased their equipment and an officer vehicle. Since 1947, the Toys for Tots program through the U.S. Marine Corps has distributed more than 530 million toys to more than 244 million less-fortunate children. Those who missed the event can still make a monetary donation at www.toysfortots.org.

Being a lifelong learner pays off on the lake, the court, in business, and in life

By Amy Treece
Photos courtesy of Scott Aeilts

“Swedish pimples. Those are the key. Then you tip one with the head of a fathead minnow to make it pretty much irresistible.” Scott Aeilts, Sandia’s Mission Services associate lab director, knows a thing or two about fishing for walleye after growing up in St. Paul, Minnesota, where it ranges from an average low of 9 degrees in the winter to a high of 71 degrees in the summer. According to Scott, this is time of year everyone should be at the colossus known as Lake of the Woods on the border of Minnesota and Canada. “It’s perfect right now. It’s the most dangerous time of the season for ice fishing with only a few inches of ice layering the lake, but the walleyes are definitely biting.”



ON THE LAKE — Scott with a prize catch of walleye.

When asked why anyone would head out when it’s freezing and risk falling into the frigid water, he answers, “It’s a measured risk; we definitely don’t do anything to jeopardize our safety. We also consider the return on our investment. When the potential reward is great, it’s worth whatever we put in – whether it’s on the lake or in our day-to-day jobs.” It seems that Scott was learning great business practices long before he went to college.

Flexibility

Scott didn’t just ice fish. He and his family and friends were on the lake year around. In the winter, they fished from ice shacks. In the warmer months after the thaw, they would go out in boats. “You have to be able to adjust to shifting environmental conditions; you adapt, try different techniques, and when needed, go unconventional.” Walleye, the state fish of Minnesota, are known to be finicky. They don’t like a lot of light since they are nocturnal feeders; they are sensitive to wind conditions and bite more when the water is rough



ON THE WATER — Scott with his daughter enjoying some time together.



QUITE A HAUL — Scott with his sons on one of their many fishing trips.

as the conditions make it seem more overcast to them. (This rough water is known to Minnesotans as the “wall-eye chop.”) Scott notes that things that work one day may not always work the next. “You bring in your expertise, start with what you know works, but if things aren’t going well, be willing to do something different. It’s innovation that can bring in the greatest, most unexpected successes.”

Overcoming obstacles

After graduating from St. Cloud State University with a degree in accounting, Scott’s adventurous spirit led him to work at Alliant Techsystems (ATK). There he learned about American aerospace and defense by working in their Minneapolis headquarters before he and his family headed to Arizona so he could take on the role as ATK’s director of Finance, Contracts, and IT. “While we were there in 2004,” he said, “ATK acquired an ordnance business of Boeing in Mesa. They had a precision munitions capability we felt could be nicely integrated into our Precision Systems Group.”

According to Scott, it wasn’t an easy transition. The leadership team had to demonstrate to the Boeing employees that the endeavor was in their best interest since the culture and goals seemed quite different at first glance. “We first grew our relationship by being true to our word, overcoming some substantial obstacles together, and then helping them win lucrative contracts.” He pauses before adding that they grew that portion of their business by 600 percent in five years. “The business climate wasn’t for the faint of heart, but just like I said about ice fishing, if you’re willing to get out there, engage a lot and risk some, the payoff can be substantial.”

“Give the best you can, be willing to do whatever needs to be done, put the team before yourself, and be a part of solutions.” — Scott Aeilts

Resiliency

From ATK, Scott edged ever closer to Sandia when he moved to Honeywell Federal Manufacturing & Technologies (FM&T partners with Sandia as NNSA’s Kansas City National Security Campus) and assumed the position of chief financial officer. They’ve relocated three times in the last 13 years, and he’s been consistently amazed at how his three kids adapted. “They are so resilient,” he says proudly of the two sons and daughter that he and his wife Lisa are raising. “They adjust to every curveball life throws at us.” His boys play basketball and baseball for La Cueva now, and his daughter participates in competitive dance at Dimensions Studio here in Albuquerque. His wife, his high school sweetheart and a strong athlete in her own right, always finds time and energy to help others wherever they live. “One of Lisa’s passions,” Scott adds, “revolves around helping at-risk mothers develop a strong support network so they can adjust to the curveballs they face as well.”

Strong work ethic

Scott’s dad worked for a printing company for 40 years and didn’t take a sick day for 38 of them. The steadfast determination really taught Scott the value of hard work and dedication. “I know there were days when it was tough, but he didn’t hold back. He gave every bit of himself. When he engaged in something, he did it wholeheartedly.” Scott’s mother made sure the family knew they could achieve whatever they set out to do. “She has a fiery, passionate spirt, and she always told us, ‘Never let anyone tell you can’t do something. Give it everything.’” Scott was 15 when he got his first job at a company in Minnesota called North Star Ice. “I learned about earning cold hard cash because it was well below zero in the room where I did one of my most difficult jobs,” he chuckles. The augers at the company were triggered to cut off blocks of ice by sensors which would sometimes stop functioning if they were blocked. One of the things Scott had to do was climb up, figure out what was blocking the sensor, and get things moving again. He grins. “I guess that was my start in the high-tech world.”

Teamwork

Scott grew up on the basketball court as did his three older brothers. “I’m the shortest out of all of us,” he reveals. (Scott is 6’5.”) Scott learned to play all the positions because that’s what his St. Paul high school coach needed, but points out one similarity between every role. “Regardless of whether I was the point guard,



ASSOCIATE LABS DIRECTOR SCOTT AEILTS heads up Mission Services. “I love being part of a team that can influence a whole enterprise. Sandia provides us with an opportunity to carry out a mission that’s larger than any one of us.”

(Photo by Randy Montoya)

shooting guard, center, or power forward, I had to learn to keep my eyes open for people around me. My team had to be in my sights. It’s the same in business. We all have a position that requires us to stay focused and work together. You accomplish nothing alone.”

Scott’s view of what it takes to be a good teammate was also influenced by those off the court. His school had a strong curriculum for students with mental and physical handicaps, and he belonged to a student-led organization specifically to help them be successful and well-integrated. “My mom worked as a teacher’s aide at a school for special needs children, and she always made sure we treated everyone with respect, so joining the group seemed pretty natural to me.” Scott became close with the students he mentored and was honored when they would come to the basketball games. He offers, “Some voices would reach out to us even on the court, and I was really humbled to hear those guys



TIME OUT — Scott and his family enjoying vacation time.

cheering. They taught me what adversity really means.” The friendships he made through this outreach affected how he views diversity today. “Everyone has gifts. That’s what you focus on.”

Seeing the big picture

Mission Services is a unique organization that supports all of Sandia, and Scott enjoys the diversity that it brings through Business Excellence, Supply Chain, finance, program and project management, and IT. “I love being part of a team that can influence a whole enterprise. Sandia provides us with an opportunity to carry out a mission that’s larger than any one of us.”

When asked what advice he would give to those just starting out in their careers, he doesn’t hesitate in his answer. “Give the best you can, be willing to do whatever needs to be done, put the team before yourself, and be a part of solutions.” He ends with, “And when you need a break. Head out to the lake. The ice fishing in Minnesota is great this time of year.”